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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/809,523

Applicant(s)

KOKI, KESAIRO

Examiner

LAN VINH

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 6-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 6-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-893)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/16/2008 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection. The applicants argue that none of the previously cited reference of Takeuchi et al, Taylor, and Ackerman, taken alone or in combination, discloses that it is necessary to use the fine powder particles of colloidal silica included in the machining liquid on carrying out the non-contact polishing step in order to obtain the glass substrate having the defect size of 0.05 gm or less. That is, no one of Takeuchi et al, Taylor, and Ackerman discloses "a non-contact polishing step of polishing, after the local machining of the flatness control step, the surface of the glass substrate subjected to the local machining by the action of a machining liquid interposed between the surface of the glass substrate and a surface of a polishing tool without bringing the surface of the glass substrate into contact with the surface of the polishing tool, the machining liquid comprising fine powder particles of colloidal silica and an

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aqueous solution selected from water, an acidic aqueous solution, and an alkaline aqueous solution," as stated in amended claim 1. This argument is moot in view of the new ground of rejection of claim 1 under 35 U.S.C 103(a) based on Takeuchi (US 2002/0157421) in view of the newly cited reference of Dyer et al (US 2002/0151255) and Ackerman (US 2002/0157421) since Dyer discloses a CMP method comprises a step subjecting a glass substrate to the action of a machining liquid interposed between the surface of the glass substrate and a surface of a polishing tool without bringing the surface of the glass substrate into contact with the surface of the polishing tool, the machining liquid comprising fine powder particles of colloidal silica and an aqueous solution selected from water (page 3, paragraph 0040; page 5, paragraph 0053. The new ground of rejection is discussed below

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al (US 2002/0179576) in view of Dyer et al (US 2002/0151255) and further in view of Ackerman (US 2002/0157421)

Takeuchi discloses a method for fabricating a glass substrate which is suited for

photomasks/mask blank used in photolithography, the glass substrate having a flatness of 0.01 microns (not greater than 0.05 microns) (page 2, paragraph 0015), which reads on a mask blank being used in a transfer mask which is for use with EUV light since the glass substrate for an EUV mask blank required to have a flatness of 0.05 microns or less as disclosed in page 6 of the instant specification. The method comprises the steps of:

measuring the height of the peak and valleys on the surface of the glass substrate (page 1, paragraph 0010), which reads on measuring a convex/concave profile of a surface of the glass substrate for a mask blank

obtaining the data about the peaks and valleys on the glass substrate (page 2, paragraph 0021), which reads on specifying the degree of convexity of a convex portion present on the glass surface, plasma etching/local machining upon the substrate surface having the peaks and valleys to control the flatness of the surface of the glass substrate to 0.04 nm (not greater than 0.25 microns) (page 2, paragraph 0021), which reads on controlling a flatness of the surface of the glass substrate to a value not greater than a reference flatness required in lithography using the EUV light as the exposure light since the reference value of the flatness being 0.05 micron as disclosed in page 6 of the instant specification

subsequently, subjecting the glass surface to a polishing step (page 2, paragraph 0016)

Unlike the instant claimed invention as per claim 1, Takeuchi fails to specifically disclose performing a non-contact polishing step of polishing/hydroplane polishing, after the local machining of the flatness control step, the surface of the glass substrate subjected to

the local machining by the action of a machining liquid interposed between the surface of the glass substrate and a surface of a polishing tool without direct contact there between bringing the surface of the glass substrate into contact with the surface of the polishing tool, the machining liquid comprising fine powder particles of colloidal silica and an aqueous solution selected from water, an acidic aqueous solution, and an alkaline aqueous solution

Dyer discloses a CMP method comprises a step of subjecting a brittle material substrate to the action of a machining liquid/polishing solution hydroplaned/ interposed between the surface of the glass substrate and a surface of a polishing tool/ without bringing the surface of the glass substrate into contact with the surface of the polishing tool, the machining liquid comprising fine powder particles of colloidal silica and an aqueous solution comprises of acid (page 1, paragraph 0009, page 3, paragraph 0034, 0040; page 5, paragraph 0053)

Since Takeuchi is concerned with a step of polishing glass (low-k material), ones skilled in the art at the time that the invention was made would have found it obvious to modify Takeuchi method by performing a non-contact polishing step of polishing/hydroplane polishing the surface of the glass substrate, as taught by Dyer, in order to reduce an amount of friction between the workpiece and the polishing surface thus reducing an amount of damage imparted to a low-k material on a surface of a workpiece (page 1, paragraph 0005, 0009)

Takeuchi and Dyer also fails to specifically disclose that the glass substrate being made of SiO₂-TiO₂ glass

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Ackerman, in a method for producing fused silica glass ,discloses the use of SiO₂- TiO₂ glass (page 1, paragraph 0005)

One skilled in the art at the time the invention was made would have found it obvious to modify Takeuchi and Dyer method by using SiO₂-TiO₂ glass as the glass substrate in view of Ackerman teaching because in page 1, paragraph 0005, Ackerman discloses:

[0005] The mask structure consists of a substrate ("mask blank"), a reflective multilayer stack formed on the mask blank, and an absorber formed on the multilayer stack. Typically, the multilayer stack includes alternating layers of Mo and Si or Mo and Be. The absorber defines the pattern to be replicated on the silicon wafer. The mask blank may be made of silicon or glass or other suitable material. It is important that the mask blank has a low thermal expansion so that it does not distort under exposure to the EUV radiation. Titania-doped fused silica (SiO₂-TiO₂) is one example of a glass that can be made to have a very low thermal expansion, i.e., lower than pure fused silica with the potential for a coefficient of thermal expansion that approximates zero. The coefficient of thermal expansion of the

4. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al (US 2002/0179576) in view of Dyer et al (US 2002/0151255) , Ackerman ((US 2002/0157421) and further in view of Ohnuma (US 6,924,068))

Takeuchi as modified by Dyer and Ackerman has been described above. Unlike the instant claimed inventions as per claims 6-8, Takeuchi , Dyer and Ackerman fails to disclose the steps of forming a thin on the glass substrate and patterning the thin film and transferring the thin film pattern of the transfer mask onto a semiconductor substrate by lithography

Ohnuma discloses a method for fabricating a photomask comprises the step of patterning the thin film and transferring the thin film pattern of the transfer mask onto a

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glass substrate by lithography (col 4, lines 53-60)

Since Takeuchi is concerned with etching the glass substrate, one skilled in the art at the time the invention was made would have found it obvious to modify Takeuchi and Dyer and Ackerman method by patterning the thin film and transferring the thin film pattern of the transfer mask onto a glass substrate by lithography as per Ohnuma because Ohnuma discloses that resist pattern formed by photolithography is utilized as a mask for processes such as etching base film (col 1, lines 16-20)

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al (US 2002/0179576) in view of Dyer et al (US 2002/0151255), Ackerman (US 2002/0157421) and further in view of Ohnuma (US 6,924,068))

Takeuchi as modified by Dyer and Ackerman has been described above. Unlike the instant claimed invention as per claim 9, Takeuchi and Dyer, Ackerman fails to disclose forming a reflective multilayer on the glass substrate and forming a light absorber film on the reflective multilayer film

Ohnuma discloses a method for fabricating a photomask comprises the step of forming a reflective multilayer includes chromium on the glass substrate and forming a photoresist/light absorber film on the reflective multilayer film (col 4, lines 58-62)

One skilled in the art at the time the invention was made would have found it obvious to modify Takeuchi, Dyer and Ackerman method by forming a reflective multilayer includes chromium on the glass substrate and forming a photoresist/light absorber film on the reflective multilayer film as per Ohnuma because Ohnuma discloses that the photomask

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utilized in the semiconductor manufacturing process comprises of a light- blocking film/reflective film formed in the desired photoresist pattern

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAN VINH whose telephone number is (571)272-1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lan Vinh/
Primary Examiner, Art Unit 1792

